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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/766,976

Filing Date: January 29, 2004

Appellant(s): CHANG ET AL.

Rohini K. Garg (Reg. No. 45,272)  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 10/17/2008 appealing from the Office action mailed 12/17/2007.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

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A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**NEW GROUNDS OF REJECTION**

A new grounds of rejection under 35 USC 101 is advanced herein.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

Awe Franke et al. Autonomous Driving Goes Downtown. I.E.E.E. Intelligent Systems, 1998, pages: 40-48.

Ming Yang et al. Vision-based Real-time Obstacles Detection and Tracking for Autonomous Vehicle Guidance. Real-time Imaging VI, Proceedings of SPIE Vol. 4666, pages 65-74, 2002.

**(9) Grounds of Rejection**

**Grounds of rejection to be review on appeal.**

**2. NEW GROUNDS OF REJECTION**

***Claim Rejections - 35 USC § 101***

**3. 35 U.S.C. 101 reads as follows:**

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

**4. Claim(s) 1-12 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent<sup>1</sup> and recent Federal Circuit decisions<sup>2</sup> indicate that a statutory “process” under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a**

<sup>1</sup> *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

<sup>2</sup> *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. Regarding independent claim 1, it discloses a “method/process” which does not tie to another statutory category and thus does not qualify as a statutory process. Other claims are rejected because they are depending on the independent claim 1.

**The following ground(s) of rejection are applicable to the appealed claims:**

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5, 7, 13-14, 16, and 20-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Awe Franke et al. Autonomous Driving Goes Downtown. I.E.E.E. Intelligent Systems, 1998, pages: 40-48.

Regarding claim 1, Franke teaches a method of detecting an imminent collision (page 40, column 1) comprising the steps of:

Capturing and preprocessing imagery of a scene proximate a platform (capture region of interest of image prior to the application of intensive algorithms to recognize object)( page 42,

second column, Object recognition);

Producing from the imagery a depth math (2D depth map) (page 41, column 3, last 3 lines);

Tessellating the depth map into a number of patches and selecting a plurality of the patches of the depth map for processing (the selection of rectangular boxes of point features/patches to generate depth map) (FIG. 4 and page 42, column 1), wherein said processing comprise classifying the selected plurality of patches of the depth map into a plurality of classes (page 41, column 1, “detect and classify different additional traffic participants, such as bicyclists or pedestrians;”; page 41, column 1, “A polynomial classifier subsequently classifies detected lane boundaries as curbs, markings, or cluster.”; and page 44, column 2, “The classification stages involves color, shape, and pixel values.”); detecting a potential threat in the tessellated depth map during the processing of the selected plurality of the patches (page 42, column 1, and FIG. 4) (page 41, first column, “stereo-based obstacle detection and tracking”, first paragraph; page 41, third column, last paragraph);

Estimating the size of the detected potential threat (object's width) (page 42, column 1, second paragraph);

Estimating the position of the detected potential threat (page 42, column 2, first 5 lines);

Estimating the velocity of the detected potential threat (motion/speed/acceleration estimation) (page 42, column 1 and column 2);

Performing a trajectory analysis of the detected potential threat using the estimated position and the estimated velocity (road recognition) (page 42, column 3, Road Recognition to page 43, column 1); and

Performing a collision prediction based on the trajectory analysis (estimation of relevant traffic and potential obstacles) (page 41, column 1).

For claim 2, Franke discloses the method further including determining if a collision is imminent based on the collision prediction (obstacle detection) (page 41, column 3, last 3 lines and page 47) and on the estimated size (object's width) (page 42, column 1, second paragraph) of the potential threat.

Referring to claim 3, Franke also teaches a method further including filtering the estimated position and filtering the estimated velocity before performing trajectory analysis (Kalman Filter to estimate motion/speed/acceleration (page 42, column 1 and column 2);

For claim 4, Franke teaches the method wherein the filtering includes Kalman Filtering (page 41, column 3).

Regarding claim 5, Franke further discloses the method wherein estimating the velocity of the detected potential threat includes the step of identifying 2-dimensional feature correspondences from imagery produced in different frames (2D depth map to track cluster of image frame to frame) (page 41, column 3, last 3 lines to page 42, column 1).

For claim 7, Franke teaches the method wherein estimating the velocity of the detected potential threat further includes the step of estimating velocity using Random Sample Consensus (arbitrary data) (page 43, column 1).

Regarding claim 13, please refer back to claims 1 and 2 for the teachings and explanations.

For claim 14, Franke teaches the system wherein said collision detector includes a filter for filtering image noise and outliers from said estimated position and from said estimated

velocity before performing trajectory analysis (Kalman Filter) (page 41, column 3).

Referring to claim 16, Franke teaches the system further including a host vehicle, wherein said stereo camera pair is mounted in fixed locations relative to said host vehicle (page 41, column 2, second paragraph and FIG. 1).

Regarding claim 20, please refer back to claim 1 for the teachings and explanations. In addition, Franke teaches a computer readable medium having stored thereon a plurality of instructions, the plurality of instruction including instructions which, when executed by a processor causes the processor to perform the claimed limitations (computers to run program including instructions) (page 47, column 3).

For claims 21-22, please refer back to claims 3 and 5 for the teachings and explanations.

#### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6, 15 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awe Franke et al. Autonomous Driving Goes Downtown. I.E.E.E. Intelligent Systems, 1998, pages: 40-48 as applied to claim 1 above, and further in view of Ming Yang et al. Vision-based Real-time Obstacles Detection and Tracking for Autonomous Vehicle Guidance. Real-time Imaging VI, Proceedings of SPIE Vol. 4666, pages 65-74, 2002.

Regarding claim 6, Franke teaches the 3D map of the environment and 2D depth map (page 41, “Stereo-based obstacle detection and tracking”, first paragraph) in estimating the

velocity of detected of potential threat. However, Franke does not explicitly teach the obtaining 3D correspondences from the 2-dimensional feature. Ming teaches a system for obstacles detection and tracking for autonomous vehicle guidance which shows that it is well known to extract 3D information from 2D images for visual guidance (page 65, Introduction, second paragraph). Modifying Franke's method of detecting collision would able to further provide the flexibility for visual guidance in detecting obstacles. This would improve processing and therefore, it would have been obvious to one of the ordinary skills in the art to modify Franke according to Ming.

Regarding claims 15 and 23, please refer back to claims 5 and 6 for the teachings and explanations.

***Allowable Subject Matter***

8. Claims 8-12, 17-19, 24-26, and 27-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**(10) Response to Argument**

**(A) The following discussion relates to the rejection of claims 1, 13, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Awe Franke et al. "Autonomous Driving Goes Downtown" I.E.E.E. Intelligent System, 1998, pages: 40-48. (herein after "Franke")**

1. Appellant's argument ---- The Appellant argues (top of page 8 of the Appeal Brief) that Franke does not disclose a method of detecting an imminent collision that includes classifying a selected plurality of patches of the depth map into a plurality of classes.

Examiner's response ---- The Examiner respectfully disagrees with the Appellant's statements. As thoroughly explained in many Office Actions including the Office Action filed 12/17/2007, the Examiner has clearly explained reasonable interpretations of Franke's reference and how to apply its disclosure to the limitations of the claim. First, Franke teaches a method of detecting an imminent collision (a system/method designed to help autonomous driving that is tries to avoid unpredictable hazards) (page 40, first 2 columns). Franke further teaches a method of classifying a selected plurality of patches (a method that classifies the detected/recognized small traffic signs/lights in a highly colored environment or classifies only traffic participants. It is apparent that small traffic signs/lights/traffic participants must be selected out of the entire colored environment for further processing. If they were not selected, then the systems would not able to further to classify the traffic signs/lights/traffic participants selectively out of the entire colored environment) (page 41, column 1 and FIG. 1) (for a complete explanation on classification, please read the entire page 41) of the depth map (FIG. 4; **Depth map**) (more

information on depth map can be found at page 42, column 1) into a plurality of classes (page 41, column 1, "detect and classify different additional traffic participants, such as bicyclists or pedestrians"; page 41, column 1, "A polynomial classifier subsequently classifies detected lane boundaries as curbs, markings, or cluster."); or page 44, column 2 "The classification stages involves color, shape, or pixel values.").

2. Appellant's argument ---- The Appellant argues (page 8 of the Appeal Brief) that Franke does not disclose a concept of classifying portion of a depth map since the Appellant asserted that Franke is classifying pixels of an image. The Appellant indicated that the depth map is tessellated into a plurality of patches, the patches are then classified and that to tessellate is to form small squares or blocks, as floors or pavements or to from or arrange in a checkered or mosaic pattern. Also, the Appellant insisted that Franke does not describe classifying selected portions, but instead teaches classifying a whole image.

Examiner's response ---- The Examiner respectfully disagrees with the Appellant's statements. As established above (**(10) Response to Argument, 1. Examiner's response**) that depth map (FIG. 4) as disclosed by Franke also clearly show a concept of tessellating a depth map into a number of patches (FIG. 4). First, FIG. 4 demonstrates clearly is a processing of detected objects which clearly indicated (**(10) Response to Argument, (A) 1. Examiner's response**) is a processing of the selected objects/portions of image and thus resulted the selected portions of the depth map (FIG. 4). Again, FIG. 4 clearly demonstrates a formation of small squares/blocks in a checkered or mosaic pattern (defined by the Appellant, page 8 of the Appeal Brief). Further citation of Franke to show the concept of tessellating a depth map into a number of patches can also be found at page 42, column 1 "This step fits a rectangular box to the cluster

of feature points that contributed to the depth map's extracted area". Additionally, after the concept of tessellating a depth map, Franke further discloses a concept of classifying to images into classes of object (page 42, column 2, "Object recognition" paragraphs). Therefore, the are concrete evidences disclosed by Franke and valid reasons to demonstrate that Franke teaches a concept of tessellating a depth map into a number of patches and further classifying portions of a depth map.

Also for the Appellant's information, pixels to one of ordinary skill in the art also are known as blocks of an image.

For further arguments presented by the Appellant in the Appeal Brief (pages 9-12 of the Brief), the Examiner respectfully request to refer back to the Examiner's responses presented above since the arguments are depending on the basis of the arguments that were explained.

**(B) The following discussion relates to the relation of claims 6, 15 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Franke and Ming Yang et al. Vision-based Real-time Obstacles Detection and Tracking for Autonomous Vehicle Guidance. Real-time Imaging VI, Proceedings of SPIE Vol. 4666, pages 65-74, 2002.**

1. Appellant's argument ---- Regarding claims 6, 15 and 23, the Appellant argues (page 13 of the Appeal Brief) that since claims 6, 15 and 23 by virtue of their dependence on independent claims 1, 13 and 20 and because of the deficiency of the part of the Franke's reference and thus cannot be cured by combining the Franke's reference with Yang's reference, therefore the rejection of claims 6, 15 and 23 should be reversed.

Examiner's response ---- The Examiner respectfully disagrees with the Appellant's statement. Please refer back to the Examiner's response of section 10(A) for the validity of the rejections with respect to claims 1, 13 and 20. Thus, the rejection of claims 6, 15 and 23 is maintained because of their dependence to independent claims 1, 13 and 20.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

This examiner's answer contains a new ground of rejection set forth in section (9) above. Accordingly, appellant must within **TWO MONTHS** from the date of this answer exercise one of the following two options to avoid *sua sponte dismissal of the appeal* as to the claims subject to the new ground of rejection:

**(1) Reopen prosecution.** Request that prosecution be reopened before the primary examiner by filing a reply under 37 CFR 1.111 with or without amendment, affidavit or other evidence. Any amendment, affidavit or other evidence must be relevant to the new grounds of rejection. A request that complies with 37 CFR 41.39(b)(1) will be entered and considered. Any request that prosecution be reopened will be treated as a request to withdraw the appeal.

**(2) Maintain appeal.** Request that the appeal be maintained by filing a reply brief as set forth in 37 CFR 41.41. Such a reply brief must address each new ground of rejection as set forth in 37 CFR 41.37(c)(1)(vii) and should be in compliance with the other requirements of 37 CFR 41.37(c). If a reply brief filed pursuant to 37 CFR 41.39(b)(2) is accompanied by any

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amendment, affidavit or other evidence, it shall be treated as a request that prosecution be reopened before the primary examiner under 37 CFR 41.39(b)(1).

Extensions of time under 37 CFR 1.136(a) are not applicable to the TWO MONTH time period set forth above. See 37 CFR 1.136(b) for extensions of time to reply for patent applications and 37 CFR 1.550(c) for extensions of time to reply for ex parte reexamination proceedings.

Respectfully submitted,

/Brian Q Le/

Primary Examiner, Art Unit 2624

**A Technology Center Director or designee must personally approve the new ground(s) of rejection set forth in section (9) above by signing below:**

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MARK R. POWELL

Conferees: DIRECTOR  
TECHNOLOGY CENTER 2600

/Brian P. Werner/

Supervisory Patent Examiner, Art Unit 2624

/Bhavesh M Mehta/

Supervisory Patent Examiner, Art Unit 2624